ADDRESS

OF

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U. S. Corps of Topographical Engineers,

Delivered at the **BOARD OF TRADE ROOMS**, June 28, and repeated before the **CORN EXCHANGE ASSOCIATION**, of Philadelphia, July 11, 1860.

UPON

OCEAN STEAM SHIPS,

PROPOSED TO RUN BETWEEN

PHILADELPHIA AND EUROPE, AND CALIFORNIA,

IN THE LINES OF A CORPORATION TITLED THE

"California, Philadelphia,

AND

European Steamship Company."

PHILADELPHIA:

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ADDRESS.

Mr. Chairman and Gentlemen:

I come before you this morning, by special invitation, to repeat before the Corn Exchange Association, an address which I had the honor of delivering, by request, at the rooms of the Board of Trade, of your city, a few evenings since.

The occasion upon which we are assembled, involves a question in which, it seems to me, every man, woman and child, composing this great city, must have an important pecuniary interest; and more especially may it be said in this connection, that it is a question in which those composing the commercial element of this community, have a vital pecuniary interest at stake.

Who of this great city, I ask, are to be held responsible for the performance of that particular duty to her interest, which consists in reviving, upholding, and perpetuating her foreign commerce?

Can this duty be performed without the generous aid, hearty co-operation, and determined exertions of her importing merchants?

Does it not devolve especially upon the merchants in general, of this natural centre of commerce, to put their shoulders manfully to the wheel, to place Philadelphia in *direct* communication with foreign ports, by the *most approved* means of the day?

I.—FOREIGN IMPORTATIONS TO PHILADELPHIA DURING THE PERIOD OF FOUR YEARS, COMMENCING WITH 1856, AND ENDING WITH 1860.

I do not intend, on this occasion, to give you a dissertation upon commerce in general—such a discussion would be taxing your patience too much—nor is it necessary to a lucid compre-

hension of the matter of this address. But, in the commercial period of four years just passed, there are certain facts staring us in the face, which are especially pertinent. They stand prominently outward, and afford data well worthy of your careful attention—I may say, of your anxious solicitude.

What do the records of your foreign commerce show for the period in question? They show that, during the last fiscal year, 1858–59, the dry goods imported *directly* into Philadelphia, amounted to $2,839,570, and that of this class of goods the amount *indirectly* imported, through New York City, into Philadelphia, was $21,815,430; making the total imported, direct and indirect, from foreign ports, in 1859, to have been worth $24,655,000.

In 1856, the records exhibit the *direct* foreign importations of this class of goods to the amount of $6,364,665.

Thus it is seen, that the falling off in the *direct* yearly import has been such, that in 1859 it is less by $3,525,095 than it was in 1855.

A further search into the record shows, that while the total amount imported directly and indirectly into Philadelphia, has been increasing from period to period, that portion which comes *direct* is diminishing at a great rate, (as illustrated by the comparison just drawn,) and that the portion which comes *indirectly* through the Custom House of New York, is *increasing* in the same great ratio.

For the *foreign* dry goods trade then, it certainly appears, that New York is fast becoming the port of entry for Philadelphia.

Let us glance at the Philadelphia *direct* imports from foreign countries, of a class other than dry goods, denominated "general or heavy merchandise."

In 1855, this amounted to $10,221,020; in 1859, to $11,677,971; showing an increase of $1,456,951 in favor of 1859.

We thus perceive, that the *direct* foreign import of heavy merchandise into Philadelphia, has increased yearly in the same period by nearly one and a half millions. For this class of foreign imports then, no one can say that New York is becoming the port of entry for Philadelphia.

What are the causes for this contrast? Why is it, that while New York becomes the port of entry for eighty-eight hundredths

of all the foreign dry goods imported for Philadelphia, on the contrary, for other goods, Philadelphia maintains her own direct importations?

Is it not owing, in a great measure if not wholly, to the fact, that the lighter classes of goods are transported for the Philadelphia Merchants almost exclusively by steamship lines, of which Philadelphia has none, and therefore they must come through New York; and that the heavy merchandise is transported more by sail vessels, of which Philadelphia is not destitute?

The latest report from the Philadelphia Board of Trade informs us, that in the manifests of the Havre, Southampton and Liverpool lines of steamers, a large list of Philadelphia houses appears in every case, with as much regularity as the list of New York importers.

Certain it is, that the quantity of foreign goods, both dry and heavy, actually imported for Philadelphia *through New York*, has grown to such magnitude, that it is due to the interests of Philadelphia to examine into the question of the ultimate effect this kind of *indirect* importation, if continued, must have upon all branches of industry pertaining to this point as a centre of commerce.

Thus far I have touched upon imports in light and heavy goods. Now there is another kind of foreign importation to which I beg leave briefly to call your attention—I refer to the emigrant travel to and through Philadelphia.

The statistics of the Pennsylvania Railroad Company inform me, that for the period of four years we have taken, the *direct* importation to Philadelphia, averaged yearly 9,353, and the *indirect* importation, via. New York, to Philadelphia, averaged yearly 10,696. Both of these numbers of emigrants, making very nearly 20,000, come (direct and indirect) to Philadelphia to pass through to the West, and it is estimated that 5,000 more come to stop in Philadelphia, or to pass through to places South, as their ultimate destination; of this five thousand, about one-half come by the way of New York, and the other half direct to Philadelphia.

We thus have had an aggregate importation of emigrants to Philadelphia to the number of 25,000 annually, during the period in question.

There is one noticeable feature in this emigration to Philadelphia; the yearly number has varied very little from one year to another, while the yearly number arriving at New York has fluctuated exceedingly, as shown by the fact that in 1858 the number arriving there was but one-half that of the previous year. This would seem to indicate a constant determination in the current of these people for Philadelphia, in spite of the tax of fifty cents upon emigrant's baggage at quarantine, and one of fifty cents per head imposed by the Guardians of the Poor of Philadelphia.

I have thus briefly brought to notice the condition of the foreign importation to Philadelphia as it does now exist, and has existed for the period of four years just passed.

You will observe, gentlemen, that this commercial period involves all those drawbacks upon trade and emmigration, as affected by the extraordinary financial pressure, which had its existence during this very period. Therefore, calculations based upon the foregoing data, for the profits of a new enterprise for the coming periods, may be fairly considered as much below the mark of realization, as we may reasonably expect the coming periods of time to be more propitious than they have been for the past period. It seems to me certain, that for the next four years to come, the foreign imports in goods and emigrants will not be less, but that they must be considerably greater than in the past period.

II.—PATRONAGE OF PHILADELPHIA MERCHANTS TO EXISTING STEAM-SHIP LINES.

I understand the number of importing houses in Philadelphia engaged in foreign dry goods imports to be about sixty, and those engaged in foreign imports of other goods to be about eighty. Say that one-half of the latter import from Europe, and we shall have the total number of Philadelphia houses importing from Europe, amounting to one hundred.

These Philadelphia houses, to the number of 100, then, are directly and indirectly, helping to sustain, by their patronage, steamship lines between New York and Europe. It is no exaggeration to say that they contribute, in the shape of freights, storage, charges, &c., no less than $2,181,543 yearly, to sustain

the steamship lines now centering at New York, and this too, on the foreign dry goods alone, imported to Philadelphia *through New York*, to say nothing of the patronage given besides, by Philadelphians taking passage in those ships; also to say nothing of the cost of transportation of the goods from New York to Philadelphia.

I take it for granted, that all such importing houses would, most willingly, make these importations by a steamship line running directly to Philadelphia, provided they could be insured as much safety, as short a time, and as cheap freights as are now realized, by way of New York. Yea, more—if they could be certain of these conditions, they would prefer to patronize the line to their own city, rather than to land at New York, and bring their imports thence to Philadelphia.

Again, it is not to be denied, that the thirteen thousand emigrants who annually come by the way of New York to Philadelphia, would be more willing to come direct, were there suitable ships coming here that would bring them safer and cheaper than those in which they now pay $30 and find themselves.

And again, none will dispute that a due proportion of first and second class passengers crossing the Atlantic would patronize a steamship line from Philadelphia, provided they could be insured as good accommodations, as low fare, and as much safety and speed as they now obtain in the lines to and from New York, especially when we consider the fact that Philadelphia lies directly in the route of the greatest number of these passengers, who go to New York to embark, and of those who, on returning, have to pass through Philadelphia to distribute themselves over the West, North-West and Southern portions of our country.

III.—IMPROVED STEAMSHIP LINES.

Now let us suppose a steamship line established at Philadelphia, which would *exceed* those at New York, in speed, safety, accommodations and cheapness.—Who will deny that all the present imports to Philadelphia, via. New York; all the present emigrants to Philadelphia, via. New York, and many of the

passengers to and from Europe, would immediately patronize this line?

And should the Philadelphia line *very much exceed* the New York and European lines in all those points, then it may be asserted, without the fear of contradiction, that the Philadelphia line would have its hands full to accommodate all the passengers, the emigrants and the shipping merchants that would be anxious to give it employment. Instead of importing to Philadelphia, via. New York, it would be importing to New York, via. Philadelphia.

The New Jersey Railroads would be doing a considerably increased business, probably to the amount of 15 to 25 per cent., by carrying these imports eastward to New York.

Besides the twenty-five thousand emigrants now coming here, there would be vastly more who would be clamorous for berths in the Great Steamship to come via Philadelphia to America, and thus the Pennsylvania Railroad would receive a great augmentation to its business in transporting these people to the West.

The Merchants and Capitalists of Philadelphia, by establishing and fostering such an enterprise, would be doing to their city, what would not only improve her foreign commerce very much, but they would, at the same time, be certain of realizing handsome returns for their investment. They would be renovating, maintaining and perpetuating the foreign commerce of the *natural* commercial centre of this Continent. They would be disbursing millions in their own city, that now go out annually to be disbursed in other cities. The influx of passengers into the city, arriving and departing, in the improved ship, would leave millions among the trades-people, the shop-keepers and hotel-keepers, that now go to swell the importance of the city of New York. Has not the City of Philadelphia a natural right to respectfully ask her shipping merchants and her capitalists to look into this subject? Have not the other interests of this great city, a right to demand that her foreign commerce shall not be allowed to dwindle away by the withholding of such patronage as her shipping merchants and capitalists are able to give to such an enterprise?

IV.—SUCCESS OF THE UNDERTAKING.

It is undoubtedly true, that the measure of the *success* of the undertaking, both in regard to a revival of the foreign trade, and as to the profits of the investments, must depend upon the possession, by the Steamships, of the following conditions:—greater safety, greater speed, better accommodations as to room, less pitching and rolling, and consequent less sea sickness, and an equal or greater degree of cheapness in fare and freight, than pertain to any Steamships now afloat on the Atlantic.

V.—THE RANDALL SHIPS.

Some nine months ago, Captain Randall announced his project for attaining all these conditions so essential to success, by starting two lines—one for California, and one for Europe—from Philadelphia, making it a bona fide Philadelphia enterprise.

After an absence of eight months from this city, I find, on my return, that this great enterprise has by no means been allowed to sleep; but, on the contrary, that those who *understand* the peculiar merits, and the superiority of his design over any other known, are still firm in the conviction that this enterprise is bound to go on to a practical realization of all that he claims for it.

It is about three years since I carefully examined his design in San Francisco, where its publication, by drawings and specifications, first met my observation. Knowing the great service he had done, years ago, in the way of revolutionizing the Steamships on our western lakes, I the more readily entered upon a critical examination of his new design, and, after a patient investigation of it, I had no hesitation then, I have had none since, I have no hesitation *now* in expressing my conviction, that it *must be a success*, as soon as executed—exceeding in speed, safety, accommodation, and exemption from sea sickness, any Steamship in existence, whether it be upon the lakes, on the Atlantic, or on the Pacific.

I trust I shall not be regarded too tedious in going into a brief analysis of the "Randall Ship" in reference to the conditions I have named as essential to success.

The drawings and specifications show, that the keel is to be 480 feet long, the length from stem to stern 500 feet, and 60 feet beam, the hull to be divided by iron partitions, called bulk heads, into 7 water tight compartments, so that in case of being stove, it cannot sink. Running fore and aft, and constituting the frame of the sides of the ships, are two arched trusses of wood and iron, of the most ingenious construction. The vertical depth from the crown of the truss down to the level of the keel is about 53 feet. In the truss is also interwoven, a *counter* arch. The trusses, therefore, not only prevent a *sinking* of the two extremities and *rising* of the middle, but they likewise prevent a *rising* of the extremities and *sinking* of the middle of the ship. And thus the ship is effectually prevented from any bending or breaking, in the direction up or down, in a fore and aft vertical plane. And by a most perfect system of lateral bracing, interwoven with her tiers of beams, she is prevented from bending or breaking in the direction of a horizontal plane running fore and aft through the ship. Where strain by tension or pulling is exerted, wrought iron is to be used; and where thrust or compression is exerted, wood is used; and where both compression and extension are felt, wood and iron together are used.

Applying the formulæ for determining the strength of a truss, acted upon as these will be in the ship, it will be found, that in proportion to the weight of the materials used, she will be stronger than the "Great Eastern."

At certain intervals she is to be surrounded with a system of iron bracing,which will effectually prevent any twisting or writhing in the ship apprehended to arise from the "chop seas" which are so fatal in many cases to long vessels. These braces also tie together the different sections of the ship in the most perfect manner.

The water tight compartments for the hull, will prevent the hull from sinking, in case of being stove by a vessel running into her, or by coming in contact with an ice-berg, rock or reef; and such catastrophies as the "Arctic," "Pacific," "Yankee Blade," "Central America," "Winfield Scott," "Tennessee," "Austria," "Hungarian," "Walker," and a score of others have met with, will be next to an impossibility for the "Randall Ship."

She is to be provided with thirteen fire engines and pumps worked by steam, and capable of throwing 100 hogsheads of water per minute, thus affording ample means for extinguishing any fire that may occur, whether by lightning or any other cause.

She is to be a four story ship ; thus, commencing at the bottom and going upwards, we have the first story or hold, 16 feet high in the clear, with ample room for the machinery, boilers and coal, and for a great quantity of freight besides. All this great weight of engines, machinery, boilers, coal, freight, &c., in the very bottom of the ship, will act as ballast placed in the right position to insure stability, and to relieve the ship from that dangerous top heaviness usually observed in many sea steamers.

Next comes the second story cabin, capable of accommodating 1,500 emigrants, or those who wish to take the lowest price fare, which is to be $25, and found. This story, besides ample room for this class of passengers, has also space for the storage of great quantities of light freight.

Next comes the third story, capable of accommodating 800 second class passengers, the fare in which is to be $50, and found. This cabin is to be arranged with family rooms, bath-rooms, and distinct apartments for ladies and children, which last are so much needed but never found in existing ships.

Next comes the fourth story, or saloon deck, with 175 family state rooms, double beds in all, and of a size 12 by 8 feet. This saloon story is to be capable of accommodating 700 first class passengers, at a fare of $100, and found. Besides these state rooms, there are to be, on this deck, a saloon of 375 feet, uninterrupted length ; a dining room, 150 feet long ; a drawing room, 150 feet long, also a social hall, reading room, and library hall, 50 feet long, and a smoking room, 45 feet long. The arrangement for cooking and eating, and for private bathing, &c., aboard the ship, are to be equal and similar to those of a first class hotel—like the Continental.

A sky-light, with movable windows, will run the entire length of the saloon, for 375 feet, affording the most perfect facilities for light and ventilation.

The ship is arranged, in addition to the facility for carrying passengers, with a special design for carrying large amounts of merchandise at the same time. Her great size—allowing the

freight to occupy the space usually devoted in other ships to steerage passengers, within which 2,000 tons can be safely stowed—will enable her to carry passengers and freight at rates reduced much below those now paid.

So much for the general features of this magnificent conception. Now I shall not be at all surprised, that there may be some within the sound of my voice, who may very naturally and very properly ask, "Who is Captain Randall, that he should presume to come forward with such a design to bespeak our patronage?" "Is he a visionary schemer?" "What practical ability or experience has this man, that he should claim our confidence and support in his design of a steamship to run between Philadelphia and Europe, that is to eclipse all now on the ocean?"

Gentlemen, such questions are quite natural. But Captain Randall is not a man to shrink from the inquest. These cross questions I stand here a voluntary witness to answer, having a personal knowledge of his antecedent doings for twenty-two years past, in respect to his building, fitting, and running of steamships upon the lakes, and upon the Atlantic and Pacific oceans.

I can assure you, that 17 years ago, he designed and built a steamship—the "Wisconsin"—at Detroit, Michigan, and ran her successfully through three of the American lakes, between Buffalo and Chicago, carrying freight and passengers, in spite of "strong head winds," on round trips of 2,000 miles, time and again, averaging a through speed quite up to that credited as the *maximum* to the "Great Eastern."

The "Wisconsin" was 218 feet long and 38 feet wide. Following her, the "Empire" came out in 1845, with a length of 251 feet, and width of 38 feet. The ordinary business speed came up to 16 statute miles per hour.

The era of swift, large steamers, adapted to lake or sea, must be fixed in 1843. The achievement belongs to Captain Henry Randall, whose indomitable perseverance admitted of no halt, from the inception to the accomplishment; though, during the whole of his memorable struggle, opposition, in the shape of ridicule, prediction of failure, contempt, and even the charge

of insanity, was showered upon him, with a force greater, even, than to the views of the designer of the "Great Eastern;" whose inception, by Mr. Brunel, dates in 1848, five years subsequent to the completely successful experimental proof of the correctness of Randall's principles, as illustrated in the "Wisconsin."

Since 1843, steamers upon the lakes, following up the impetus given by Randall, have been growing larger, and increasing in speed, so that, for some years past, and at the present time, twenty miles per hour is a fair average for the regular working speed through the whole trip; and twenty-four miles per hour is what they can perform in favorable circumstances, without over-straining the ship or its machinery.

We could instance the names, dimensions and speed of several, but it will suffice to notice two—the "Western Metropolis" and the "City of Buffalo." These are precisely of the same dimensions—340 feet in length and 42 feet breadth of beam—and of the same power of engine and draft of water, which is $9\frac{1}{4}$ feet.

Does any gentleman present desire the evidence of his senses as proof of these statements of speed and lightness of draft? Let him go to Buffalo, and take a trip to Cleveland and back, in either of these steamers which are now in active service on Lake Erie, and he will *see* the proof. Why, the "Cleveland Herald" reports, that not two weeks since, on the trip between Buffalo and Cleveland, the whole run was made at an average rate of 21 miles per hour, by the "Metropolis," and the Captain said "There was no attempt to make fast time, but the boat seemed to run away with her engines." The same authority informs us, that about a week since, the "City of Buffalo" made the same run, averaging still greater speed than 21 miles per hour. These are not opposition, but sister boats, alternating in the same line.

To every judge, who is personally acquainted with navigation on the Lakes, on the Atlantic and on the Pacific, I state nothing new or liable to contradiction by him, when I assert the fact, that the opposing causes to steamer speed are quite equal on the lakes to those on the Atlantic, and greater than on the Pacific—taking the trips through and for a series of seasons. These

facts are now conceded by all acquainted with these waters, and are undeniable. Therefore, it is equally undeniable, that a steamer best adapted to safety and high speed *upon the lakes*, ought, if put on the salt sea, to be equally adapted to safety and high speed upon the Atlantic, and to still higher degrees of safety and speed upon the Pacific, to say nothing of the greater buoyant effect of ocean over lake water, which is about one-thirtieth in favor of the ocean steamers.

The two ships just named are the fastest known steamships. In smooth water they make their runs in about the same time, but in a heavy sea the speed of the "Buffalo" is considerably greater, and the rolling less than with the "Metropolis," owing to the difference in the shape of their respective bottoms.

Now, here are important facts, affording most useful practical lessons to the builder; for the superiority of the "Buffalo," in heavy seas, in battling the waves, consists merely in the fact that her bottom is comparatively flatter than the bottom of the "Metropolis;" in no other respects do they differ in model.

Captain Randall, whose experience has been equally wide upon ocean as upon lake, has not failed to seize upon these practical lessons, and apply them in the design of his great ship, for it is to correspond in model as nearly as possible—I may say exactly—in its lines and proportions to the "City of Buffalo," whose model now lies on the table before us.

Some of you may remember that in the "Great Eastern," the plan of "water jackets" was adopted, and consisted of surrounding the funnels by concentric iron cylinders, having their head and bottom hermetically joined to the funnels, and filling the annular space between, with cold water, which became heated to such a degree as to become steam, bursting one pipe and doing vast damage on her first trial trip. This "water jacket" plan had been tried years ago by Randall for the "Wisconsin," and rejected. Whether they have been removed from the Great Eastern I do not know, but certain it is, that from his former experience of their danger, he allows no similar contrivance to enter his great ship.

I should not fully answer your questions in relation to Captain Randall's antecedents were I to stop here, nor should I be doing justice to the merits of his inventions, nor would you have an

adequate idea of the novelty of the "Randall Ship," in regard to some of her essential differences from all others.

This great design is no imaginative conception of a visionary theorist. It is the embodiment, into a harmonious plan, of good results, obtained during thirty years' experience in managing, building and running steamships in all three of the great waters, the lakes, the Atlantic and the Pacific.

The arrangement and number of the motors, the distribution of the points of application of the powers of the engines, the model of the ship, the independency of action and simplicity of the machinery, and the stiffening of the ship, are the results of genius regulated by a series of experiments commenced in 1838, and continued, with occasional interruptions, to the present time. Among the most important of the experiments instituted, was that with a long yawl boat, having four side paddle wheels, each pair running upon its own crank shaft, and the shafts susceptible of being adjusted and worked at greater or less distances from each other, and the wheels being turned by two men—one at each crank. By this arrangement, he discovered several valuable principles, viz.:

1. That at certain positions and distances apart for the wheels, the boat went no easier with two than with one pair of wheels.

2. That it was necessary to have a larger diameter for the hindmost than for the foremost wheels, causing a greater dip in the water for the hinder pair.

3. He discovered the exact location on the side of the boat where the hinder, as well as the forward wheels, should be placed. Also the distance apart of the two shafts, to cause the greatest help in the hinder wheels to propelling the boat.

4. He also discovered that the power of the two men working at the forward wheels would give—when the hinder wheels were at rest out of water—a certain speed to the boat, answering to a given number of revolutions per minute: and then, by putting the hind wheels at work, with the forward wheels turned with the same number of revolutions per minute, as when unaided, the boat was propelled considerably faster, though not with a double speed.

5. He also discovered the principle, that it was much better for the success of the boat, on several accounts, to have the action of the two pairs of wheels exerted on independent shafts.

6. And that the total power was more effectual in propulsion, by having it divided and applied, by the intervention of four wheels, than when concentrated upon one pair of wheels.

Here are the facts which established, in the mind of Randall, the advantage of a four side-paddle-wheel steamer, by assigning the *right positions* for the wheels on the sides of the ship and giving them the *proper* diameters.

Accordingly, his ship is to be furnished with two single marine engines, placed fore and aft—at the distance of 130 feet apart, each engine turning its own shaft and pair of paddle wheels, to be of diameters and located so as to attain a maximum speed.

In this four-wheel-two-shafts-two-engine-steamer, the actions of the engines will be independent of each other. The machinery, and the arrangement, are characterised by great simplicity —a desideratum whose value is only appreciated by those having experience of the fatal results and loss of power arising from complex machinery and complicated arrangement for applying and transmitting power. The independent working of the engines guarantees great security against detention from any derangement of machinery that may happen. This independence also enables the ship to be immediately checked and backed off from danger ahead, or kept off a lee shore—advantages not obtained in engines as used in the ships of any of the lines now in operation.*

I must now beg leave to take you with me for a short time, through the Atlantic, into the Pacific Ocean, because, you cannot be put in possession of all the practical facts having a direct bearing on the subject upon which we are met without such a trip.

Among the fastest ocean steamers was probably the "Yankee Blade," built by Mr. Mills, with a single engine, upon a model approved by Captain Randall—who commanded and ran her around Cape Horn, for service in the Pacific between San Francisco and Panama, where her performance was from 13 to 15

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* I am told that very recently a British Steam Propeller, with a large amount of treasure, has been lost from this very cause, against which Randall has provided.

knots per hour, on runs of 3775 statute miles. The results of the experiment with this ship in both oceans established the value of the principles of Randall's improvements beyond cavil, proving them to be quite as applicable to ocean as to lake navigation.

Many of you, doubtless, remember the awful suspense in which we were held for weeks, in respect to the fate of the splendid new ship San Francisco, built in New York, and started to go, under the command of Captain Watkins, around the Horn, for service in the Pacific. This was one of the finest and best ships, it was supposed, ever built by the Mail Ship Company.

While yet in the Atlantic, and only after some two days out, she encountered a storm, December, 1854, which overwhelmed her, and drowned many on board.

The "Yankee Blade," before alluded to, under command of Captain Randall, started about the same time, on her first regular trip, for Aspinwall, and encountered the same storm, at a distance not many miles apart from the "San Francisco." The "Yankee Blade" weathered the storm in the handsomest manner, dividing the water so as not to ship a sea, and battled her way successfully without sustaining any damage.

Now, what do we infer as to the cause of the destruction of the one and the safety of the other?

The "Yankee Blade" was built, as before said, with a model approved by Randall. Her draft of water was only 11 feet, her bottom was comparatively flat, bow sharp, &c.; in short, upon the model of the "City of Buffalo."

The "San Francisco," on the contrary, was built on the old fogy model, which at the present time characterizes almost all the ocean steamers in the European and California lines. It is a model that rolls in a swell, being too round, and it pitches fore and aft, from the crown to the hollow of the wave, and draws from 17 to 23 feet of water.—The San Francisco drew 21 feet. I have conversed with several intelligent officers who were on board the ill fated ship at the time. They attribute the chief and almost only cause of her destruction, to her great draft of water and roundness of bottom: she was so deep in the sea that she could not rise with the swell before the next wave would sweep over her upper deck.

I have brought this example into evidence to illustrate to you that, all other things being equal, a *light* draft sea steamer, in a swell at sea, is safer from destruction in the storm than a *deep draft steamer*. I could adduce other examples, were it necessary, to prove the same fact.

The "Yankee Blade" ran through the Atlantic around the Horn into the Pacific, where she proved her qualities for *speed* quite as successfully as she did her qualities for *safety* in the Atlantic.

The steamer, "J. L. Stephens," in the Pacific, is one of the fastest belonging to the Mail Steamship Company, built, however, upon the old fogy model. In a fairly contested trial of speed, Randall commanding the Yankee Blade, and Pearson commanding the J. L. Stephens, from San Francisco to Panama, a distance of 3,775 statute miles, it is reported that the "Yankee Blade" came in ahead of the "Stephens," by 11 hours. The coal consumed per 24 hours by the "Blade," was 30 tons; that consumed by the "Stephens," was 40 tons,—both being single engine boats,—but the "Stephens" drew some 4 to 5 feet more water than the Blade. Here is another practical proof of the value of Randall's views, which are, that a light draft, flat bottom sea steamer, is propelled *faster* than one with a deep draft, round bottom, can be, with a given consumption of coal.

It also shows, that on a long trip, 30 tons of coal per day is adequate, in a single marine engine, to the attainment of a very high speed; provided the ship is of light draft and flat bottom, sharp at extremities, and of proper length and width of beam.

The practical principals here illustrated, Captain Randall has not failed to introduce into his design of a four-wheeled ship.

I trust that I have said enough upon the antecedents of Captain Randall, to convince you that his views in presenting his magnificent design for the ships from Philadelphia to Europe and to California, are entitled to the highest consideration.

VI.—SEA STEAMER SPEED.

It has fallen within the province of my official duties to the government, to obtain a knowledge of the *practical working* sea steamer speed, of the *fastest steamers* now engaged in the navigation of the lakes, the Pacific and the Atlantic.

1. On the Pacific, between San Francisco and Panama, on the round trip of 7,550 miles, the average working speed is 11.67 statute miles per hour.*

2. On the Atlantic, between New York and Aspinwall, on the round trips of 4,784 miles, the average working speed has been 9.5 statute miles per hour.

3. In the Gulf of Mexico, between New Orleans and the mouth of the Coatzacoalcos River,—the Atlantic terminus of the Tehuantepec Transit,—the average working speed is 14.23 statute miles per hour.

4. On the Atlantic, between New York and Europe, on trips of 3,068 miles, nautical, for the three quickest each ever made, it was for the

"Persia,"	- 13.95	nautical, or	16.08	statute miles	per hour.
"Vanderbilt,"	13.86	"	15.98	"	"
"Washington,"	10.65	"	12.28	"	"

The "Persia" may be regarded as the exponent of the swift side-paddle wheel *British* steamers. The "Vanderbilt" may be taken as the exponent of the swift *American* side-wheel ships. The "City of Washington" as the fastest propeller, or stern screw steamer.

These, doubtless, are the measures of the best efforts these vessels are capable of exhibiting for their working or business speed, all the way through their routes, under the most favorable circumstances of weather. From a comparison of these rates, we at once perceive that it is idle to suppose a propeller can compete for the supremacy, with any hope of success, with a side-wheel ship, whether for carrying freight or passengers, between Europe and America. The establishing of an additional line of propellers to those already existing, would, there-

* Since the Collins Steamers have been put on, probably this rate of speed has been somewhat increased.

fore, be hazarding an investment to come into competition—not with FAST, but with SLOW ships.

The "Great Eastern," on her first trial, made, as her maximum, only the rate of 14 knots per hour, and that only for a distance of 8 miles. On her trial just before she started for this side, running a round trip of 200 miles, she is reported to have averaged 12½ knots per hour. On her trip across to New York, by her log as reported, I find her average run was only 13.3 knots, 14.18 statute miles per hour—drawing 27 feet of water, light.

Her speed thus far, is less than for the *quickest* trips of the "Vanderbilt" and "Persia," by 1.65 knots the hour. To our regret—though not to our surprise—in speed she comes much short of the expectation of her designer, who estimated that she would average 15 knots per hour. Her failure in point of speed, I attribute *chiefly* to two defects in her design.—1st, to her enormous draft of water in proportion to the power of her motors.—2d, to faults in her model—it being too much on the old fogy standard yet in vogue in all the ocean steamers of British design.

5. ON THE LAKES, seventeen years ago, the "Wisconsin," "Empire," and that class of boats, exceeded, on round trips of 2000 miles, the speed now credited to the "Great Eastern." But now, and for some years past, we know, that the lake steamers on their round trips, have an average working speed of 20 to 21 statute, or 17.78 nautical miles per hour.

The superiority thus shown in the speed of the lake steamers, is not owing to an excess of applied power—the fastest lake ships have single engines—76 inch cylinders—12 feet stroke. It is owing to the shape of the hull being such as to divide the water better, and to give very much less draft of water; and so long as a blind adherence to round bottoms and deep draft shall be allowed to obtain, in the construction, ocean ships never can come up to a high standard of speed or safety in a troubled sea.

VII. — WHAT ARE THE CONDITIONS REQUIRED FOR AN OCEAN STEAMER TO BE PRE-EMINENTLY SUCCESSFUL?

She must be constructed—1st. Of such model in the shape of her bottom, and breadth of beam, as will prevent rolling, and give ample room in the hold for all the freight. 2d. Of such length of keel, as will enable her to ride on two waves, and catch upon the third, in all ordinary swells, before her keel leaves the hindmost wave. 3d. Of ample room in the cabins for passengers. 4th. Of a draft not to exceed 15 feet, when loaded down to her full capacity. 5th. Of such shape in the sides of her hull, as will reflect off the waves impinging thereon, rather than of a shape to invite them aboard. 6th. Of a speed exceeding 15 miles per hour in heavy, and 18 miles per hour in calm seas. A construction insuring these six conditions would, necessarily, involve all requisite subordinate conditions, and it would be sufficiently strong to remove apprehension of its breaking to pieces by its own weight, or by the power of its engines and the waves, or by any other than extraordinary causes.

Of these six conditions, the "Great Eastern" only fulfills numbers 2 and 3, and is wanting in 1, 4, 5 and 6.

The question may now be asked, How can Philadelphia acquire supremacy in ocean steam traffic? At all events, how can she take to herself the portion of this traffic that by right belongs to her?

The answer is simple and obvious. Let her construct a ship that shall fulfill the six before named conditions, and put her afloat, which can be done in nine months after laying the keel—not copying the mistakes in draft and model of the "Great Eastern"—not copying the antiquated models and deep drafts of the "Vanderbilt," the "Persia," nor indeed of any of the old slow stagers now on the oceans. But apply the principles that have been so completely successful on the lakes, and a triumphant result will follow.

Captain Randall's plan of ships for new lines to Europe and California, made public by specifications, drawings and models, some time since, fulfills every one of the six conditions named, and in respect to the conditions of speed and lightness of draft,

it goes a degree or two beyond what, for the present, is essential to supremacy; and in the same degree in which it exceeds these conditions, just in the same proportion will the profits of the investment and degree of supremacy be exalted.

I think I have already shown, by practical analogical facts, beyond cavil, that this plan embodies all the elements of *personal safety*, in a higher degree, than obtains for any ship afloat.

There are other elements in the plan, not yet particularly noticed, upon which he who is to embark his money in the enterprise will lend an attentive ear.

VIII.—INDEPENDENT ACTION.

The independency of the engines, shafts, and wheels, besides the great saving of fuel which it is known will accrue in consequence, would insure against any serious delay on the voyage, or against the necessity of turning back to repair; for in case one of the duplicated working parts should break or become deranged by accident, the other independent engine and machinery system would carry the ship safely and more speedily into her destined port than any other ship now known.

IX—COAL—DRAFT OF WATER—NUMBER OF PASSENGERS—AMOUNT OF FREIGHT.

The ships will coal at Philadelphia, taking here sufficient for the whole round voyage, thus dispensing with those immense coaling stations along the line to California and the European ports, which are accessories ruinous to the profits of any steamship company.

The measure of the ship is 8,000 tons. The draft of the ship, when loaded with 3,000 passengers, 3,000 tons of freight and all the coal required for the whole round trip, will be only 13 to 14 feet. The consumption of coal per day is only 40 tons for each engine, 80 tons per day for both. The dip of her wheels in the water will vary only about 11 inches from port to port, in crossing the Atlantic. Starting with 6 feet dip, she will arrive with about 5 feet. The "Persia" starts with a dip of 10 feet, and arrives with a dip of 5 feet—having 5 feet variation

in her dip for the passage. She draws 23 feet of water, and consumes 130 tons of coal per day.

It is to be observed, that in the Randall ship there must be decided economical advantages, well known to the initiated, because she is maintained, by the distribution of her bunkers and the position of her machinery, which keeps her upon an even keel, and with so slight a variation in the dip of her wheels, while plowing the ocean on the whole round trip of over six thousand miles.

In virtue of the enormous weight of the screw at the stern of the "Great Eastern," an evenness of keel is unattainable. She draws two feet at the stern more than at the bow, which causes her to be running on an up grade of 15.53 feet per mile; and there is no remedy that would not be worse than the disease so long as the screw remains to elongate her tail.

An up grade of 15.53 feet per mile, causes an absolute loss of power of 0.05 very nearly, *i. e.* in every hundred tons of coal she consumes, 5 tons are expended in consequence, producing no effect in giving speed.

It is said she consumed 300 tons per day, or 3,300 tons on the passage; hence the total loss on the trip on account of up grade, must have been 165 tons of coal. Such loss may be very favorable to coal dealers, but it is ruinous to steamship stockholders. This loss, it will soon appear, would keep the Randall ship running more than two days.

The whole amount consumed in both engines of the Randall Ship, in the whole round trip, to Europe and back, will not exceed on an average of trips, under the circumstances of all weathers, 10 to 12 hundred tons. The Persia consumes, on her round trip, 25 to 26 hundred tons.

In the British, India and Australia lines, on the round trip of 22,500 miles, I find the average consumption of coal, by the steamers, to be 26 hundredths of a ton per mile. By taking the above estimate for Randall's Ship, I find the consumption will be at an average of 20 hundredths of a ton per mile, on the round trip.

X.—PITCHING AND ROLLING.

The model of the Randall hull, being flat bottom, wide and long, and her draft being light, is such as must insure less rolling than in the Great Eastern. This might be inferred from the experiment, before referred to, with the "Metropolis" and "Buffalo," the hull of the "Great Eastern" being shaped more like that of the "Metropolis," while Randall's is to be like that of the "Buffalo."

The length of Randall's ship, together with the *positions* of of her engines and shape of her bottom, will undoubtedly insure an equally small amount of pitching as will be felt in the "Great Eastern," if not less. And hence we infer that very much exemption from sea sickness would be realized.

All other things being equal, this consideration alone would draw to Philadelphia hundreds of passengers to embark for these long voyages, and of course the same preference would be shown by passengers coming to America, to say nothing of the additional inducements arising from the first class hotel accommodations that would be found aboard of her.

XI. SPEED OF THE RANDALL SHIPS.

This is a question of course of the highest importance, next to safety, in estimating the question of profits. I shall therefore give you the results of rigid investigations into facts.

I have before said, that I have taken much pains to obtain the times and distances run for the three shortest trips ever made by the "Persia," and that the average of her speed for the trips, was, 13.95 nautical miles per hour, corresponding to this the running distance given by her log between New York and Liverpool is 3068 nautical miles.

By the simplest calculation, therefore, it will be seen, that any ship to accomplish this run in 7 days (of 24 hours,) must have her speed put up to 18.24 nautical, or to 20.98 statute miles per hour. Now as before shown, the "City of Buffalo" performs this very nearly in her round trips on the lake, *with one pair of wheels and one engine.*

Let the Randall ship therefore have a model in all respects

similar to the "City of Buffalo," and you will see, by the proofs I have adduced, that with one pair of wheels and one engine, she would make the passage in just about 7 days. By his experiments, Captain Randall discovered that by an additional engine and another pair of wheels, he could add 5 miles per hour to the speed of the ship. It is within the limits of experimental proof then, that with one engine and one pair of wheels, she would come up to fourteen nautical miles per hour; and that by her hinder engine and wheels, five miles per hour would be added—making her total nineteen nautical or 21.98 statute miles per hour. This would cause her to make the passage between Philadelphia and Liverpool, in six days, eighteen hours.

This argument is what may be called a "clincher." The Vanderbilt interest, the Cunard interest, the United States Mail patronage-seeking-interest, the British Government subsidy interest, the Galway interest, the Screw Propeller interest, and all others opposing the Randall or Philadelphia enterprise, may put this argument "into their pipes and smoke it" till doomsday: and it shall stand, for it is an argument deduced directly from *experiments already made.* It is not a result obtained alone by theory, although for the credit of the enterprise, I will say, that theory *rightly applied to the problem*, confirms it. But it is a practical result, a fixed fact.

Do you wish to know the time by this ship between Philadelphia and San Francisco? It would be 14 days 6 hours, by way of the Panama Railroad transit. By the Nicaragua *river, lake and stage road transit* as it now is made, the time between Philadelphia and San Francisco would be 14 days 2 hours, or 11 days and 2 hours, should this transit be furnished with a railroad.

Of all the routes, the Tehuantepec is the one which is susceptible of the shortest time between all our Atlantic and Pacific ports. By this, taking the transit across the Isthmus as it now is, by river and stage road, the time by the Randall Ships, between Philadelphia and San Francisco would be 11 days 10 hours, and when the railroad is completed, it would be 9 days 10 hours. Of this transit, some of you are doubtless aware, that the Coatzacoalcos River forms a part. Now there is a bar of hard clay at the mouth of this river, and it has been held up *terrero*, by those who, having a score of millions invested in

deep draft ships, would frighten a company honestly endeavoring to establish this route. Sea-steamers, however, constructed upon the light draft principle of Randall, can at all times enter this river, without a dollar expended in dredging, only by marking the channel with proper buoys.

Here are the practical results, in the saving of time, that would enure to that part of your enterprise having reference to California. For the last 10 years the average time between New York and San Francisco, via the Panama transit, has been 25 days; the shortest has been 20 days some hours; and that was when Randall, I believe, was pushing the "United States Mail Ship Line," with the "Yankee Blade," on the Pacific.

Establish your proposed Philadelphia and California line, and you would save $10\frac{3}{4}$ days—a third of a month in the passage—even by the Panama transit. Three millions of treasure per month is a low estimate of the amount coming over it this way. This saving of time would save the present loss of interest on this treasure of $5,000 per month, or $60,000 per year.

The cost of doing all the California Steamship business between New York and San Francisco, by all the ships now engaged in it, cannot be less than $2,190,000 per annum—current outgoes—to say nothing of the interest on the capital invested in the ships. The same amount of business could be done by Randall's ships, at a cost to the company of $876,000. Thus there would be an annual saving of outgoes of $1,314,000.

Your safe, swift, four-wheel ships, would certainly sweep all the passengers, and bring all the gold, and land it at the very door of the Mint; and the argument for moving this Institution to New York would cease. Two of Randall's ships would do all the business—and his unequalled experience would enable him to manage it. This business now requires five ships to perform it—in this fact it may be seen why expenses would be vastly lessened, rates of freight and fare of passenges reduced, and greater profits would accrue to the enterprise, than have ever yet enured to any line, though sustained, as they have been for the past 10 years, by government mail patronage, to the sum of about $750,000 per year.

The cost of running a Randall ship twelve times a year and back, between Philadelphia and Europe, is estimated at $514,800.

This is only 23½ per cent. of what the Philadelphia dry goods merchants pay annually towards supporting New York and European lines. Let them pay this per centum to the Randall ship, and she could afford to bring all they now import through New York for nothing, trusting to the passenger fare for profits. Let these Philadelphia merchants subscribe for the stock to the amount of only one-fourth of what they pay out in one year to the support of those lines, and the first ship would be built—after the first year, they need only pay 23½ per cent. per annum, of what they now pay annually, and the ship could afford to to bring all the dry goods now coming to Philadelphia through New York for nothing more—trusting to passengers for profits, and the merchants would have the dividends on their stock, to meet the 23½ per cent.

With such lines of ships as are now proposed, who can doubt that all the trans-Atlantic and trans-Pacific passengers would come to Philadelphia to embark, and land here on their return? Who can doubt that all the treasure would be brought by such a line? Who can doubt, that all the mail patronage would offer itself to this line, especially when we come to consider the speed, the safety, the accommodations, the exemption from sea sickness, and the cheapness of fare and freights?

The slow steam-ships, American and British, now so unsafe, so destitute as many of them are, of all decent comforts and accommodations, in the lines to Europe and California, would go by the board to rot, or else sink into the coasting lines. A new era would commence. Facilities adequate to the demands of progressive industry and locomotion, would be inaugurated at Philadelphia.

Observe this, the money raised to establish these lines, and to supply them with coal and provisions, would all be disbursed in Philadelphia; the money would not be taken from your city.

The cost of building and equipping one of these ships complete for sea, is estimated by the projector to be Five Hundred Thousand Dollars. This is ample, and from his intimate knowledge of building steamships, derived from his long experience in all the departments of their construction, the subscribers to the stock need not fear additional calls for funds, as was experienced in the case of the "Great Eastern."

The plan has another merit well worthy of consideration. The projector does not ask immediately for any more money than will build one ship; the others, for both the European and California line, are to be built as they are needed, from the sale of more stock and out of the earnings of the ships that go before.

One hundred persons subscribing Five Thousand Dollars each for the purchase of the stock, would set the whole design in motion. The charter of the Company is one of the most favorable that can be desired. It is owned by Captain Randall, who, during the last session of the Legislature, obtained such amendments and augmentation of capital to it, as to make it exceedingly valuable to a steamship company. His plan in adjusting the stock shares, which are of $250 each, of attaching to each share yearly coupons, entitling the holder to a $50 passage ticket in the ship, in lieu of a yearly declared dividend of 20 per cent. on the share, is novel, ingenious and practical. It has many advantages to recommend it. It takes care of the small stockholders as well as of the largest holder of stock, and secures the highest rate of profit on his single share, without trouble or care. It makes the share-holders so many agents for procuring passengers and freight for the ship; and it furthermore relieves the company from the incubus of "dead heads."

While the first ship would be building at Philadelphia, its foreign commerce would begin to look up; its manufacturing establishments would receive additional work; its ship carpenters would be pleased; the strangers coming here to see the big ship, could not help paying out of their pockets more money, to be disbursed in Philadelphia, than the whole cost of the ship. Real estate would rise 20 per cent.; houses and stores would be seen in less numbers, marked "to be let" or "to be sold."

And after the first successful trip—what then? Strangers coming from from Europe, for pleasure or business, arriving at Philadelphia, would behold and appreciate its *unequalled* beauties and advantages for a city of residence; its unsurpassed natural advantages as a centre of commerce, so highly favored in this respect by its *unchanging* harbor, its *greater depth* of water, its shorter communication by railroads than any other

port possesses with the great north-west provision producing portion of this continent. Any one can see that such a line of ships would augment the exports, materially, from Philadelphia, and that the general pulse of the city would be animated.

Soon the keel of another Randall ship would be laid, and she would be built from the proceeds of the first. All the money for the building of these would be disbursed in Philadelphia. Dry Goods from foreign countries, for Philadelphia, would no longer be entered at New York. The railroads centering at Philadelphia would receive an impetus in passenger and light freight business; the Pennsylvania Railroad would build its terminus on the Delaware, and additional facilities there would have to be constructed to accommodate the influx of passengers who would come to Philadelphia from all parts of the United States to embark for Europe, and the passengers, first class, second class and emigrants, who would come from the old country to land at Philadelphia.

This European line established, there is a very large number of persons, naturalized citizens of the United States, who would come to Philadelphia to go to their old country, not to stay, but to make a last visit to their fatherland, and return, because the fare on this line would be within their means, and the safety and good accommodations of the ship would be apparent to their comprehension.

From this source alone, hundreds and thousands of passengers would be obtained, that now only *dream* of returning to pay the last visit to their relatives, friends and childhood scenes they left behind. The terrors of their first passage in the dirty emigrant ship would be forgotten in beholding the facilities afforded them in a splendid steamer.

The travel between Philadelphia and Europe is in its infancy. The Philadelphia lines, with such ships, would be in time to meet the demands of the swelling tide of travel which is to come; and having little or no capital invested in old ships, Philadelphia would not have to wait for old ships to be worn out, for fear of jeopardizing existing steamship investments. In this respect Philadelphia stands in a most favorable condition for undertaking this new enterprise.